

Topic: Recycling in Schools

What is the Hazard or Problem:

Without a comprehensive school-recycling program:

- Schools may be out of compliance with the ban on the disposal of selected recyclable and compostable materials.
- Schools may be paying to dispose of materials that could be recycled less expensively. The law of supply and demand applies: prices go up when demand for disposal capacity increases, and the supply of disposal options decreases.
- Natural resources are wasted and students do not learn the importance of recycling as a means to conserve natural resources for their future.

Fluorescent bulbs and other mercury-containing products are often improperly handled and disposed, thereby releasing toxic mercury into the environment:

- Into the school environment when mercury-containing products are broken or mishandled.
- Into the atmosphere, and then into rivers and lakes, when these products are incinerated along with solid waste.

The Solution:

Schools can reduce the quantity and toxicity of their solid waste, as well as educate their students to be environmental stewards, by:

- Practicing the 3 R's of solid waste management: Reduce, Reuse and Recycle.
- Purchasing environmentally preferable products, including mercury free products.
- Properly handling and disposing of toxic products.

Applicable Regulations/Policies:

- Beyond 2000 Solid Waste Master Plan
- Massachusetts Waste Bans
 - The following materials are banned from disposal: recyclable paper; plastic, glass and metal containers; leaves; yard wastes; white goods; whole tires; lead-acid batteries; and cathode ray tubes (in televisions and computer monitors).
- Universal Waste Rule

Who in your Town or School Can Help:

Administrators, teachers, maintenance and cafeteria staff, parent's groups, municipal recycling coordinator, solid waste contractor.

Who to Contact for Free Government Assistance:

Massachusetts Department of Environmental Protection (DEP)

- Recycling:
 - Central Region: Irene Congdon, 978-433-3472 irene_congdon1@yahoo.com
 - Northeast Region: Barbara Scavezze, 617-654-6645 barbara.scavezze@state.ma.us
 - Southeast Region: Edith DeMello, 508-946-2725 edith.demello@state.ma.us
 - Western Region: Arlene Miller, 413-567-5027 arlenem773@aol.com
Justine Fallon, 413-755-2286 justine.fallon@state.ma.us
 - Statewide: Ann McGovern, 617-292-5834 ann.mcGovern@state.ma.us
- Hazardous Waste: Lori Segall, 617-292-5704 lori.segall@state.ma.us

Consultants to Contact for Assistance:

School cleanouts of mercury:

John Alphin, SCRAM, 508-867-9491 john@scramweb.org

Meg Wilcox, NEWMOA, 617-367-8558 x305 mwilcox@newmoa.org

Recycling Education programs:

Please see list of "Recycling Education Assistance for Public Schools Service Providers" in this section of the notebook.

Further Reading (including Electronic Resources):

DEP RECYCLING WEB SITE www.mass.gov/dep/recycle (with links to other sites)

- Electronics Recycling
 - CRTs in televisions and computer monitors
- Hazardous Products
 - Information about fluorescent lamps and mercury
 - Universal Waste Rule fact sheet
 - "Pesticide Reduction Resource Guide for Citizens and Municipalities of Mass."
- Municipal Recycling
 - "Recycling Services Directory and Markets Guide for Massachusetts"
- Regulations and Policies
 - Solid Waste Master Plan
 - Waste Disposal Bans
- Teachers and Schools
 - Curriculum and Activities: "Solid Waste Management Resource Guide for Massachusetts Schools" (contains background information and lesson plans on a wide variety of solid waste issues, including solid waste composition / disposal, natural resources, household hazardous waste, recycling, and composting)
 - School Recycling Programs: "Manual for Implementing School Recycling Programs"
 - "School Composting... The Next Step in Recycling - A Manual for Connecticut Schools"

EDUCATION

- **Green Team** <http://www.thegreenteam.org> Activities for students
- **"How can my community reduce waste?"** www.learner.org/exhibits/garbage
Interactive learning experiences in the Annenberg/CPB Project Exhibits Collection
- **Lesson Plans** that relate recycling, composting, and solid waste issues with the MA DOE Science & Technology/Engineering Curriculum Frameworks, contact Barbara Scavezze, 617-654-6645 barbara.scavezze@state.ma.us
- **US EPA, Wastes: Educational Resources** <http://www.epa.gov/osw/students.htm>
Teacher resources, waste information for students, kids page, Spanish publications

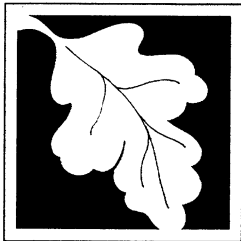
ENVIRONMENTALLY PREFERABLE PRODUCTS (and how to purchase them from state contracts) <http://www.state.ma.us/osd/enviro/products.htm>

MERCURY

- **Mercury in Schools and Communities**, NEWMOA web site: www.newmoa.org includes publications:
 - "Getting Mercury Out of Schools: Why it's a problem. Where it is. What to do."
 - "Identification of Mercury Devices in Schools" includes non-mercury alternatives."
 - "Case Study on Mercury Elimination from Bay Path Vocational Technical High School, Charlton, Massachusetts"
 - "Eight Good Ideas for Reducing Mercury Exposure and Pollution in Your Community"
- **Health Care Sector**, Sustainable Hospitals Project website has information on mercury use and alternatives in the Health Care Sector
<http://www.uml.edu/centers/LCSP/hospitals/HTMLSrc/SiteMap.html>
- **Mercury Recovery Program**, <http://208.58.133.9/health/Mercury.htm> Burlington Board of Health's web site, contains case studies, links to other sites, Training Page contains reference lists of mercury containing products

REGULATIONS: Department of Environmental Protection web site: www.mass.gov/dep

- Publications - Statutes and Regulations
 - Hazardous Waste Mgmt./Transportation; 310 CMR 30.1000, includes regulations governing the Standards for Universal Waste Management.
 - Solid Waste Facilities/Management; 310 CMR 19.017, includes regulations governing the ban on the disposal of selected recyclable and compostable materials.



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fact sheet

Your Business and the Waste Bans What You Need to Know

What are waste bans?

"Waste bans" are restrictions on the disposal and transfer for disposal of certain hazardous and recyclable items at solid waste facilities in Massachusetts.

The waste bans are designed to:

- Conserve capacity at existing disposal facilities.
- Minimize the need for new facility construction.
- Signal recycling markets that large volumes of material are available on a consistent basis.
- Keep certain toxic substances or materials from adversely affecting our environment when landfilled or incinerated.
- Promote business and residential recycling efforts.

What do I need to do? Remove & Recycle!

Business managers should remove and recycle any banned materials they generate or run the risk that waste loads will be rejected at a disposal site or charged an additional handling fee. Recycling at businesses can be easier and more economical than recycling at home, because the materials are generated in larger quantities and are easier to keep separate from the rest of the trash. Recycling prevents unnecessary disposal of usable raw materials, saves energy and reduces air and water pollution. As recycling reduces disposal costs, businesses can save money by diverting materials from the trash dumpster to the recycling bin.

Your waste hauler may be able to help you establish a recycling program. Also, WasteCap publishes an extensive Recycling Services Directory listing over 400 companies that collect or process recyclable materials. Contact WasteCap at 617-236-7715 or www.wastecap.org.

What is banned?

Recyclable Paper: All paper, cardboard, and paperboard products (EXCEPT tissue paper, toweling, paper plates and cups, wax-coated cardboard and other low-grade paper products).

Glass Containers: Glass bottles and jars (EXCEPT light bulbs, Pyrex cookware, plate glass, drinking glasses, windows, windshields and ceramics).

Metal Containers: Aluminum, steel or bi-metal beverage and food containers.

Single Resin Narrow-Necked Plastics: A soda bottle is narrow-necked but a yogurt container is not.

Leaves & Yard Waste: Leaves, grass clippings, weeds, garden materials, shrub trimmings, and brush one-inch or less in diameter (Excluding diseased plants).

Batteries: Lead-acid batteries used in motor vehicles or stationary applications.

White Goods: Appliances employing electricity, oil, natural gas or liquefied petroleum gas. These include refrigerators, freezers, dishwashers, clothes washers, clothes dryers, gas or electric ovens and ranges, and hot water heaters.

Whole Tires: Motor vehicle tires of all types (Incinerators and transfer stations can accept whole tires. Shredded tires are not restricted).

Cathode Ray Tubes: Any intact, broken or processed glass tube used to provide the visual display in televisions, computer monitors and certain scientific instruments.

Did You Know?

The waste bans apply to all solid waste destined for a Massachusetts landfill, incinerator or transfer station.

It is the responsibility of waste facility operators to make sure that unallowable quantities of banned materials are not disposed or transferred for disposal from their facilities. This is accomplished by scrutinizing incoming waste in two ways. First, all loads must be visually monitored for the presence of banned materials. Second, random inspections of waste load contents must be conducted.

Businesses and communities that do not set up programs to divert banned items from their waste run the risk of having their waste rejected at the solid waste facility or paying additional handling fees.

For more information...

on the waste bans, contact DEP at (617) 348-4002 or www.state.ma.us/dep/recycle/regs.htm. For information on commercial recycling, contact DEP at (617) 292-5987 or www.state.ma.us/dep/recycle/business.htm.

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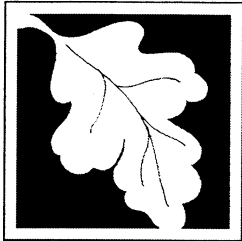
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Computer Monitors and Televisions Disposal Options for Residents and Small Businesses

In April 2000, the Commonwealth of Massachusetts adopted a first-in-the-nation approach to reuse and recycle discarded computer monitors and televisions. Cathode ray tubes (CRTs), the leaded glass picture tubes found in computer monitors and televisions, are now banned from disposal in Massachusetts landfills and waste combustors due to their high lead content.

Why are CRTs banned from Massachusetts landfills and waste combustors?

With digital televisions and faster, better computers poised to enter the market, millions of older televisions and computer monitors are destined for the trash. The National Recycling Coalition predicts that as many as 500 million computers will become obsolete by 2007. In Massachusetts alone, 25,000 tons of computers are being disposed, recycled, or placed in storage per year. These outdated electronics will further strain already limited landfill space.

In addition, CRT monitors and TVs contain an average of 4 pounds of lead each. Excessive lead and other toxins pose a problem in landfills because they can leach into groundwater or, in the case of a lined landfill, force expensive leachate treatment. In combustors, the lead winds up in the ash residue, which is in turn disposed of in landfills. Lead exposure has been linked with learning disabilities, behavioral problems and at very high levels, seizures, coma and even death. In addition, the plastic material used to house electronic components often contains brominated flame-retardants. If improperly handled, these toxins could be released into the environment.

What do I do with my old computer monitor or television?

Prior to banning CRTs from solid waste facilities, the DEP assisted in developing a program and infrastructure to ensure that residents and businesses could recycle computers and televisions. Your options include the following:

1. Contact your town/city hall to inquire if they have a recycling program for computers and televisions. Over 275 Massachusetts cities and towns have set up collection programs. Through December 2000, the DEP has awarded over \$600,000 in grants to towns and cities across the Commonwealth to defray the cost of recycling CRTs.
2. Contact a nearby TV repair shop, electronics retailer or electronics recycling company to see if they accept computers, televisions, and other electronics for recycling from residents and small businesses. (For a listing of electronics recyclers, consult the electronic equipment section of the Recycling Services Directory on the DEP web site at <http://www.state.ma.us/dep/recycle/rsd/rsd.htm>)
3. Consider donating your computer. Visit the following web sites for details.*
 - <http://www.ncecp.com> – Provides options to donate unwanted computers to students, senior citizens, and other individuals who may not otherwise be able to afford them.
 - <http://www.sharetechnology.org> – Connects computer donors and non-profit donation seekers throughout the country.

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- <http://www.microweb.com/pepsite/Recycle/Massachusetts.html> – Lists organizations that facilitate the donation of used computers for schools and community groups.
- <http://www.charityamerica.com/> - Unites donors and businesses with qualified charities from across the nation.
- <http://kidsource.com> - Helps match needy schools with excess, unused or obsolete computer equipment donated by individuals or corporations.
- http://goodwill.org/NEWS/2000/gateway_program.html - Lists Goodwill Industries locations that take donations of newer televisions and computers. Call your nearest Goodwill Industries store to determine if they participate.
- <http://www.pcsforschools.org> – The Computers for Schools Association maintains a web site to assist you in donating your computer to schools.
- <http://www.cristina.org/dsf/> - The National Christina Foundation accepts donated computers to give to people with disabilities, students at risk and economically disadvantaged persons.

4. Visit these sites to find out about additional donation and recycling options.*

- <http://www.wastecap.org:8080/wastecap/commodities/crt/crt.htm> – helps businesses identify outlets for used computer equipment.
- <http://www.electroniccycle.com/> - Located in Spencer, Massachusetts, Electroniccycle, Inc. accepts TVs, computers, audio and almost any consumer electronics product for processing.
- <http://www.ibm.com/ibm/environment/news/ptb.phtml> – Through an IBM Recycling Service, consumers and small businesses can recycle any manufacturers' personal computers, including system units, monitors, printers and optional attachments for a fee.
- <http://www.gateway.com/about/spotnews/releases.shtml> – Gateway and Goodwill Industries have partnered in a program that allows individuals to donate any manufacturers computer in working condition and receive a discount off any system from Gateway's consumer line.

Although the disposal ban applies only to television sets and computer monitors, remember that most locations will allow you to recycle or donate your entire computer including the monitor, computer, keyboard and mouse.

What happens to my old computer or television?

Often, your computer will be reused by a charity or school. Or, it may be taken apart and recycled. The different parts of the computer or television are used in many different ways:

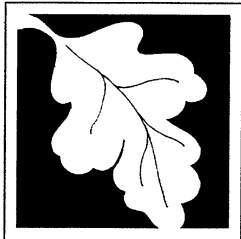
- Glass: The glass CRT is either returned to a manufacturer and made into a new CRT, or sent to a smelter where the lead is recovered and recycled.
- Plastic: The plastic housing is ground to smaller pieces and recycled for use in various items such as retaining blocks and pothole mix.
- Electronic Components: Circuit boards, chips, and other parts can be reused to repair or upgrade older electronics or recycled for their scrap value.
- Metal: Metal components will be separated and sold for their scrap value.

What are the regulations?

Like the waste bans already established for other bulky items such as appliances, tires, and automobile batteries, landfill, combustion facility, and transfer station operators can not accept CRTs for disposal. To see the regulations go to:

www.state.ma.us/dep/bwp/dswm/dswmpubs.htm#ban

**Listing here does not imply any endorsement by the DEP.*



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Universal Waste Rule in Massachusetts: Information for Small Quantity Waste Generators

This fact sheet is designed to promote collection and improve management of certain widely generated wastes. The rule is modeled after the federal Universal Waste Rule and became effective on October 17, 1997.

What Universal Wastes are covered in the Massachusetts Rule?

These wastes must qualify as hazardous wastes before they are considered universal wastes:

- hazardous batteries, primarily nickel cadmium (NiCd) and button batteries;
- mercury-containing devices, such as thermostats, manometers, switches, water meters, thermometers, and gauges;
- mercury-containing lamps, such as fluorescent lamps; and
- hazardous waste pesticides, e.g. mercury-based pesticides, arsenicals, and chlorinated pesticides; banned or suspended pesticides; pesticides subject to recall by the manufacturer or FIFRA; certain unused pesticides, and/or pesticides collected in a state-approved waste pesticide collection program.

What are the general requirements for the different handler categories?

All handlers must mark and label their containers and be able to demonstrate the length of time that the universal waste has been accumulated. All handlers have an accumulation limit of one year.

Large Quantity Handlers are handlers who accumulate 5,000 kg or more total of universal waste on-site at any one time. They must notify and keep records for each shipment received and sent for at least three years (with the exception of handlers of batteries that already have an U.S. EPA ID number).

Small Quantity Handlers are handlers who accumulate less than 5,000 kg on-site at any one time. They have no notification or record keeping requirements.

How must universal wastes be collected, stored and handled?

Handlers may ship to, collect, or receive universal wastes from other handlers and transport without a license but in compliance with U.S. Department of Transportation requirements. Businesses transporting items that individually contain less than one pound of mercury are exempt from DOT requirements. Public sector entities are also exempt so long as public sector employees transport the universal waste in public sector vehicles.

Universal wastes must be stored in a separate area marked as a Universal Waste accumulation area. Containers of universal wastes or individual universal waste items must be labeled as Universal Waste, with the name of the waste, e.g., Universal Wastes - Thermostats. Additional handling requirements depend on the type of waste:

- *Pesticides:* Containers should show the original label of the product, and must be kept closed and structurally sound.
- *Batteries:* Handlers may discharge batteries to remove the electric charge, remove electrolyte, or regenerate used batteries.
- *Thermostats:* Handlers may remove mercury-containing ampoules from thermostats over or in a container to assure that any broken ampoules that may

result in spills or leaks are contained immediately. Removed ampoules are a universal waste. The area in which ampoules are removed must meet OSHA exposure standards for mercury.

- **Lamps:** Dismantling or crushing of mercury-containing lamps must be done with a permit and in such a manner that, after processing, components can be separated into individual waste streams. The separated components must be recycled or reused and the handler must retain proof of their recycling/reuse.

What prohibitions exist for the management of universal wastes?

Disposal of universal wastes as solid waste, or treatment (except for "routine management" of batteries and mercury-containing devices, as described above), is prohibited. Handlers also are prohibited from accumulating universal wastes for longer than one year, unless the handler can prove that the activity is solely for the purpose of accumulation of such quantities of universal waste as necessary to facilitate proper recovery, treatment or disposal.

What requirements must transporters follow?

U.S. DOT guidelines must be followed for transport of wastes that meet the definition of "hazardous material" in 40 CFR 171.8. For information, call DOT's Motor Carrier Safety Office at 617-494-2770, [insert fed number] or visit [insert web page]. Universal waste batteries can be held in transit for up to ten days. If held for longer than ten days, the universal waste battery transporter becomes a handler.

Before a universal waste moves across state lines, all states through which it passes should be consulted. If a universal waste is to be transported across an intermediate state that is not a URULE authorized state, RCRA requirements may apply and a manifest and licensed transporter may have to be used in that state.

What requirements must destination facilities meet?

A Small or Large Quantity Handler must take its universal waste to another universal waste handler or to a facility that is authorized to receive and recycle, treat or dispose of a particular category of universal waste (called a "destination facility"). In Massachusetts, a destination facility must be a licensed hazardous waste Treatment Storage Disposal Facility or a commercial recycling facility with a Class C permit. Once received by a destination facility, universal wastes are managed as hazardous wastes.

Where can I find more information about the Universal Waste Rule in Massachusetts?

For more information, contact Business Compliance at (617)292-5898 (Hazardous Waste Line).

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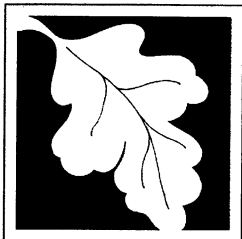
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Fluorescent Lamp Management for Businesses and Institutions

Using fluorescent lamps makes business and environmental sense because they consume one quarter as much electricity as incandescent lighting. At the same time, spent and broken fluorescent lamps need to be handled very carefully because the phosphor powder inside them contains mercury. Standard linear fluorescents, lamps with green end caps or green marking, compact fluorescents, germicidal lamps, and high intensity discharge (HID) and high-pressure sodium lamps used in outdoor lighting all contain mercury.

When broken, burned in waste-to-energy plants or buried in landfills, fluorescent lamps release mercury. Since not even the best pollution control devices can completely prevent mercury from entering the environment, the Massachusetts Department of Environmental Protection (DEP) recommends recycling all fluorescent lamps. Fluorescents that do not have green end caps or green marking must be recycled as universal waste or managed as hazardous waste. It is against the law to throw them in the trash.

Why is mercury a problem?

Mercury is toxic to the human nervous system, kidneys, liver and immune system. When inhaled or ingested, it can cause a range of physical symptoms. Mercury that is released to the environment "bioaccumulates" in fish – that is, it builds up in their tissue over time – making them less healthful or even dangerous to eat. The Massachusetts Department of Public Health (DPH) has advised pregnant women, nursing mothers, women of child bearing age and children under 12 to avoid eating freshwater fish from lakes, rivers and streams that are not replenished by government stocking programs. DPH has also recommended that all Massachusetts residents avoid certain fish from those bodies of water where sampling has revealed a significant mercury problem.

What are the risks of mercury exposure from handling lamps?

Only broken lamps pose a hazard. When they are handled properly to minimize breakage, there is little chance of mercury exposure. In fact, an active lamp recycling program can reduce the likelihood of an accidental mercury release by stressing the importance of handling lamps carefully.

Are there specific rules for handling spent and broken lamps?

DEP regulates the accumulation, storage, transportation and disposal of hazardous wastes, including fluorescent lamps, under the *Massachusetts Hazardous Waste Management Act* and the federal *Resource Conservation and Recovery Act (RCRA)*.

Fluorescent lamps may be recycled under the streamlined provisions of the *Universal Waste Rule* (found at 310 CMR 30.1000), which DEP adopted to encourage the recycling of consumer products with specific toxic or hazardous constituents. If you choose to recycle fluorescent lamps, you must:

- Store unbroken lamps in a box or fiber drum to prevent breakage, and keep that container in a secure, protected area.
- Label the container *Universal Waste – Spent Fluorescent Lamps* and mark it with the date on which you first began storing the lamps.
- Have these lamps collected by or deliver them to an authorized lamp recycler, hazardous waste transporter or another universal waste handler within one year of the date marked on the container.

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What do I do if a lamp breaks?

If it happens indoors, close off the room to other parts of the building, open a window and leave the area for at least 15 minutes to allow the mercury vapor to dissipate. When you return, scoop up the glass and powder debris with a stiff paper and place the material in a sealed container labeled *Broken Fluorescent Lamps*. Never use a vacuum cleaner, which will only disperse the mercury over a wider area, then itself need to be handled as a hazardous waste. All mercury-contaminated debris, including cleanup materials, must be disposed as hazardous waste.

How can I dispose of spent or broken fluorescent lamps?

A number of companies recycle fluorescent lighting fixtures, several of which are listed below. You may wish to contact several to obtain price quotes. You may also wish to consult DEP's online *Recycling Services Directory and Markets Guide* at mass.gov/dep/recycle/rsd/rsd.htm. Look under *Fluorescent Fixtures*. DEP cannot guarantee that recyclers listed in the directory – particularly those located outside of Massachusetts – are in full compliance with hazardous waste regulations.

Fluorescent Lamp Recycling Facilities

Advanced Environmental Recycling Corp.
2591 Mitchell Avenue
Allentown, PA 18103
(800) 554-2372

Onyx Superior
218 Canton Street
Stoughton, MA 02072
(781) 341-6080

Bethlehem Apparatus
890 Front Street
Hellertown, PA 10855
(610) 838-7034

Full Circle Inc.
509 Manida Street
Bronx, NY 10474
(800) 775-1516

American Lamp Recycling
22 Stage Door Road
Fishkill, NY 12524
(800) 315-6262

Northeast Lamp Recycling
250 Main Street
East Windsor, CT 06088
(860) 292-1992

Mercury Waste Solutions
26 Railroad Avenue
Albany, NY 12154
(518) 489-6347

Eastern Environmental, Inc.
47 Purdy Avenue
Port Chester, NY 10573
(800) 808-7227

Sources of Information and Assistance

- **General Information about Mercury:** DEP Mercury Hotline toll-free at (866) 9-MERCURY or (866) 963-7287 or <http://mass.gov/envir/mercury.htm>
- **Health Effects of Mercury:** DPH at (617) 624-5757 or <http://mass.gov/dph/beha>
- **Universal/Hazardous Waste Regulation:** DEP Business Compliance Assistance Line at (617) 292-5898 or <http://mass.gov/dep/bwp/dhm/dhmpubs.htm#regs>
- **On-Site Pollution Prevention Assistance:** Office of Technical Assistance for Toxics Use Reduction (OTA) at (617) 626-1060 or <http://mass.gov/ota>
- **National Electrical Manufacturers Association**
<http://lamprecycle.org>
- **Association of Lighting and Mercury Recyclers**
<http://almr.org>

Mercury in the home.

Mercury pollution is a serious problem across the Northeast. Even tiny amounts of mercury can cause serious health problems for people and wildlife. Mercury comes from a number of sources, including the products listed below that may be found in your home. If you throw these products in the trash, outdoors or down drains, the mercury they contain can pollute the environment. Call 1-866-9MERCURY to learn how to dispose of these products safely and responsibly.

Thermometers (fever, candy, deep fry, oven, indoor and outdoor)

Thermometers are one of the largest sources of mercury in municipal solid waste. The few drops of mercury found in a common fever thermometer have the potential to contaminate a huge number of fish. Fortunately, consumers can purchase accurate alternatives such as digital or alcohol thermometers.

Fluorescent Bulbs

Though all fluorescent bulbs contain mercury, their use is encouraged because they are highly energy efficient. Keep them out of the trash, avoid breakage and dispose of them at a household hazardous waste collection program.

Thermostats

Thermostats contain more than five times the amount of mercury in a typical fever thermometer. If you replace a thermostat, dispose of the old one through a household hazardous waste collection program. Mercury-free electronic or digital thermostats are available as replacements.

Pharmaceuticals, Detergents and Disinfectants

Mercury can be found in some topical disinfectants, such as Mercurochrome, Tincture of Merthiolate and older medications for psoriasis and eczema. It is also found in some over-the-counter nasal sprays, hemorrhoidal ointments and contact lens products. Some bleaches, detergents with bleach, stain removers and soaps also contain mercury. Read product labels and try to purchase mercury-free alternatives.

Other sources of mercury in homes

- batteries made before 1990
- button batteries, like those found in watches, calculators and hearing aids and some toys
- pilot lights in gas appliances such as stoves, water heaters, furnaces, washers, dryers and heaters
- switches found in some fire alarms, septic tanks, car trunks, pinball machines and automatic shut-off irons
- latex paint and pesticides made before 1990
- miscellaneous: counterweights in antique clocks, jewelry with glass ampules, older chemistry sets, vintage toys and pre-1997 athletic shoes with flashing lights.

To learn more about safe handling, proper disposal and product alternatives, call 1-866-9MERCURY or visit mass.gov/envir/mercury.htm.

Stop mercury from rising.

Brought to you by the Massachusetts Executive Office of Environmental Affairs and Department of Environmental Protection.

1-866-9MERCURY

1-866-963-7287

Mercury spill cleanup.

When mercury is spilled, it evaporates and gives off hazardous vapors that are invisible and odorless. If you spill mercury or break a product that contains mercury, it is important that it be cleaned up immediately.

Take immediate precautions.

Do not touch the mercury. Keep people and pets out of the area. To reduce evaporation, lower the room temperature. Open windows to ventilate the area. Remove all jewelry from your hands since mercury bonds with most metals and put on rubber gloves.

Large spills.

Large mercury spills should be cleaned up professionally. If more than one pound (about two tablespoons) has been spilled, you are required to report the spill to the Department of Environmental Protection. Call 1-888-304-1133 immediately.

Contain the spill.

Spilled mercury can spread quickly. Move furniture and other objects away from the spill and prevent the mercury from flowing into drains, cracks or crevices. Any remaining mercury will continue to emit dangerous vapors so it is important to contain every drop.

Never vacuum or sweep up the spilled mercury.

Vacuuming or sweeping up a mercury spill will spread the mercury throughout the house and contaminate your vacuum or broom.

Clean the spill.

Follow the cleanup procedure appropriate for the spill area.

On a hard surface, push the beads of mercury together with a stiff piece of paper or cardboard. Lift the beads with the cardboard and place into a plastic container. Pick up any remaining mercury with duct or packing tape or an eyedropper and place in the container along with the pieces of the broken item, the cardboard and gloves. Close the container and seal it with tape.

On carpet, cut out the contaminated section. Place it in a plastic bag. Place any pieces of the broken item in a plastic container along with your gloves. Close the container and seal it and the bag with tape.

In a drain, remove the sink trap and pour the contents into a plastic container. Close the container and seal it with tape.

Dispose of the mercury waste responsibly.

Label the containers used to collect the spilled material as mercury waste and store away from children. Never put the mercury waste in the trash! Many communities accept mercury waste at hazardous waste centers or collection events. Call your town or 1-866-9MERCURY for details.

Stop mercury from rising.

Brought to you by the Massachusetts Executive Office of Environmental Affairs and Department of Environmental Protection.

1-866-9MERCURY

1-866-963-7287

Mercury is toxic.

Mercury is a naturally occurring element that can be toxic to humans and wildlife. When products containing mercury are broken, or thrown in the trash, outdoors, or down drains, the mercury can pollute our environment and contaminate many kinds of fish. You and your family can be exposed to mercury by breathing its fumes, eating mercury contaminated fish or touching spilled mercury. Follow these tips to protect the environment and reduce your exposure to mercury.

Learn what items in your home contain mercury.

Mercury is found in many common products such as thermometers, thermostats, fluorescent bulbs and switches. The button batteries found in your calculators, watches and hearing aids may contain mercury. It is also found in cylindrical batteries made before 1990. Even some topical disinfectants, contact lens solutions and detergents contain mercury.

Never put mercury-containing items in the trash, outdoors or down drains.

When products that contain mercury are thrown away, they end up at landfills, incinerators or waste water treatment plants where the mercury can enter the environment. Many cities and towns collect mercury-containing items at their household hazardous waste collection centers or one-day events. Call your town or 1-866-9MERCURY to find out more.

Never touch or vacuum spilled mercury.

If you spill mercury or break a mercury-containing item, do not touch the mercury. Keep all people and pets out of the area and open windows to ventilate the area. Call 1-866-9MERCURY or visit www.state.ma.us/envir/mercury.htm for cleanup and disposal suggestions. Never vacuum or sweep the spill. This will spread the mercury around your home and contaminate your vacuum or broom.

Try to buy products containing little or no mercury.

Minimize your use of products that contain mercury to reduce the amount of mercury that could enter the environment. Choose alternatives such as digital thermometers or mercury-free thermostats. Though all fluorescent bulbs contain mercury, they offer the environmental benefit of energy efficiency. Do not put burned out or broken bulbs in your trash or recycling container. Dispose of them at a household hazardous waste collection program.

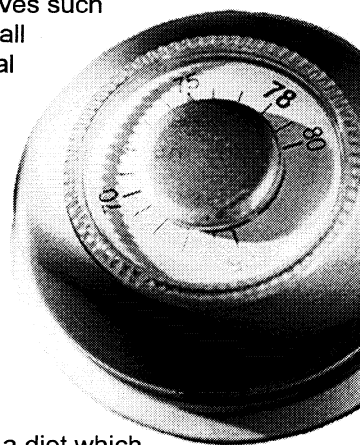
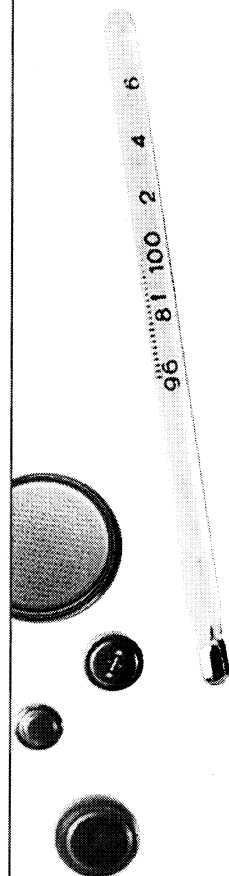
Be aware of fish consumption advisories.

Eating fish contaminated with mercury can harm you and your family. Almost half of the lakes, ponds and rivers tested in Massachusetts have some types of fish that are unsafe to eat due to mercury contamination. The Massachusetts Department of Public Health has issued advisories to warn people about eating certain fish from these waterbodies. In addition, the U.S. Food and Drug Administration has issued advisories for some saltwater fish. Fish is an important part of a diet which can lead to improved nutrition and better health. Just be sure to learn which fish are best to eat. Call 1-866-9MERCURY for details.

Stop mercury from rising.

Brought to you by the Massachusetts Executive Office of Environmental Affairs and Department of Environmental Protection.

1-866-9MERCURY 1-866-963-7287



Mercury health effects.

Mercury is a serious environmental problem in Massachusetts and throughout the country. Fish from many lakes and ponds across the northeast have mercury levels high enough to make them unsafe to eat. Even some saltwater fish, like swordfish, have high levels of mercury. Exposure to mercury through skin contact, by eating contaminated fish or by breathing mercury fumes can cause serious health effects.

Mercury is poisonous to the nervous system, kidneys, liver and immune system.

There are several different types of mercury. Although some are more dangerous than others, all are toxic. Depending on the type and amount, exposures to mercury can damage the nervous system, brain, kidneys, liver and immune system. One form of mercury, methylmercury, is extremely poisonous and can damage the brain even at low levels of exposure. People may be exposed to this type of mercury by eating some types of fish. Elemental mercury, the silvery liquid found in some thermometers and switches, is most dangerous when inhaled and must be handled with care.

Children are most sensitive to mercury toxicity.

The developing brains and nervous systems of children are very sensitive to mercury and may be irreversibly damaged by it. Children can be exposed to methylmercury by eating certain types of fish. Breaking mercury-containing products such as thermometers used in homes and schools can also result in exposure to mercury.

Women who are pregnant or who may soon become pregnant should be particularly careful about mercury.

Children can be exposed to mercury in the womb if their mothers eat foods contaminated with this toxin. The National Academy of Science estimates that 60,000 children may be born each year in the United States with neurological problems due to exposure to mercury in the womb. The effects caused by this mercury exposure may be permanent and could lead to poor school performance and health problems.

Avoid mercury exposure.

Try to avoid purchasing products that contain mercury such as fever thermometers and thermostats. Handle any mercury containing products that you have with care. Follow state and national fish advisories.

Stop mercury from rising.

Brought to you by the Massachusetts Executive Office of Environmental Affairs and Department of Environmental Protection.

1-866-9MERCURY

1-866-963-7287

Unfortunately,
unlike many
other pollutants,
mercury does
not degrade
into something
harmless once
it mixes with
air or water.

Mercury in High Schools

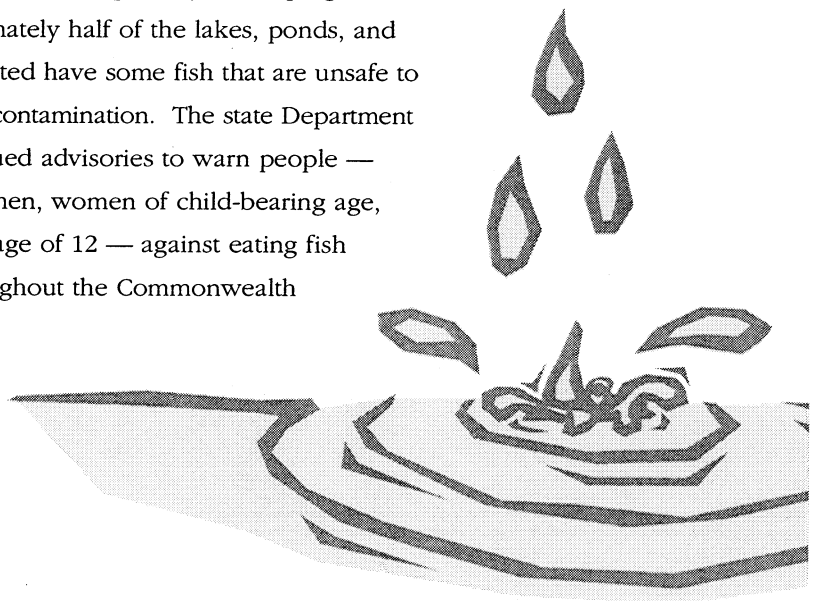
THE BAY PATH CASE STUDY

In 2001 and 2002, the Massachusetts Department of Environmental Protection (DEP), in conjunction with the Executive Office of Environmental Affairs (EOEA), sponsored a pilot project to support schools interested in removing mercury from school buildings and in educating faculty, staff and students about the hazards of mercury. Specifically, the Commonwealth was interested in assisting programs at schools willing to:

- educate students, faculty and staff about the potential hazards of mercury
- identify and remove all mercury products from the school and replace them with non-mercury alternatives
- adopt a policy of purchasing only non-mercury products wherever possible

The health hazards and environmental problems associated with mercury are well-known and well-documented. Nervous system damage, liver damage, kidney damage, muscle tremors, impaired coordination and mental disturbances all have been associated with mercury exposure in humans.

Mercury emitted to the air from trash incinerators and power plants can fall to the ground with the rain and snow. In lakes and ponds, this leads to elevated levels of mercury in fish that inhabit these water bodies. Eating fish contaminated with mercury can be harmful to humans, and especially developing fetuses. In Massachusetts, approximately half of the lakes, ponds, and rivers that have been tested have some fish that are unsafe to eat because of mercury contamination. The state Department of Public Health has issued advisories to warn people — especially pregnant women, women of child-bearing age, and children under the age of 12 — against eating fish from water bodies throughout the Commonwealth and certain marine fish.



Unfortunately, unlike many other pollutants, mercury does not degrade into something harmless once it mixes with air or water. In fact, mercury persists in the environment for long periods of time, and bioaccumulates, meaning its concentrations and harmful effects only *increase* as it moves up the food chain.

Mercury spilled in a school poses risks beyond those to the students and teachers in the room at the time of the incident.

Schools were selected as a target audience for outreach and education about mercury for two reasons:

First, **schools are potential sources of mercury emissions and exposure.** Elemental mercury is often used in science classrooms for experiments and instructional purposes. In addition, most schools use fluorescent lights, mercury laboratory thermometers, mercury fever thermometers, mercury barometers and other common items that contain mercury. Children are particularly susceptible to the potential negative health affects associated with mercury exposure, so a mercury spill in a school is of special concern.

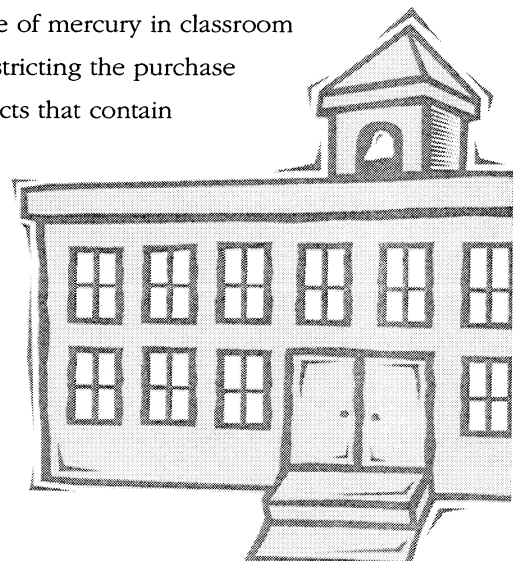
Second, **schools provide an excellent opportunity to educate teachers, students, staff and parents about the toxic properties of mercury.** Through formal curricula taught in the classroom and through policies that restrict the purchase and use

of products that contain mercury, schools can deliver the message to adults and children alike about the hazards of mercury.

This case study about Bay Path Regional Vocational Technical High School in Charlton, Massachusetts is one example of how a high school has chosen to eliminate the use and future purchase of mercury-containing products. Mercury spilled in a school poses risks beyond those to the students and teachers in the room at the time of the incident. Other potential effects of mercury spilled in a school and not cleaned up properly and immediately include:

- it can be tracked to other parts of the school and even to homes on students' shoes, resulting in mercury exposure to individuals beyond the area of the spill
- it can costs thousands to hundreds of thousands of dollars to clean up, since it must be treated as a hazardous waste
- it may result in liability claims against the school if students are exposed

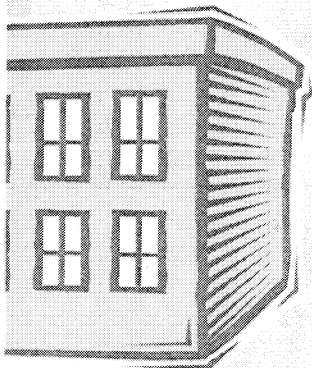
Bay Path is one school that has made the decision to protect the health of students, faculty and staff, the environment, and the school's budget by eliminating the use of mercury in classroom instruction and restricting the purchase of common products that contain mercury. We hope this case study will inspire other schools to do the same.



When the 14-member School Committee of Bay Path Regional Vocational Technical High School, located in Charlton, Massachusetts, voted unanimously to adopt a mercury-free purchasing resolution for the high school in June 2001, Business Manager John Lafleche was pleased. For several months, Mr. Lafleche had been championing the effort to rid the school of mercury in its vocational shops, science labs and health department, and to make Bay Path the first high school in the state to adopt a mercury-free purchasing policy. As the Business Manager, Lafleche will oversee the new policy requiring that the school buy only mercury-free products to the greatest extent possible.

"We really need consumers to drive the change (toward mercury-free products), and hopefully we are doing our part by not buying any more mercury products here at Bay Path," he said.

The road to the School Committee's adoption of the new policy began about eight months earlier, just after a presentation on the Right-to-Know law during a staff professional development day in the fall of 2000. John Alphin of the South Central Recycling Association of Massachusetts, Inc. (SCRAM), who gave the presentation, mentioned to Lafleche that a state-sponsored pilot program had been developed to assist schools who were interested in educating students, faculty and staff about the potential hazards of mercury; identifying and removing all mercury products from the school and replacing them with non-mercury alternatives; and adopting a policy of purchasing only mercury-free products wherever possible. Grant money provided by the Massachusetts Executive Office of Environmental Affairs (EOEA) and the Department of Environmental Protection (DEP) was available to schools that were interested. It wasn't long before Lafleche expressed Bay Path's interest.



John Lafleche, Bay Path Business Manager, and John Alphin, SCRAM, in front of SCRAM's mercury display.

"Early on, we got a mercury spill kit, and as it turned out, we needed it within five or six weeks, when a thermometer broke in the health unit," says Lafleche. "It could have been a big problem, but we knew what to do and were able to handle it properly."

With the backing of the school's Health and Safety Committee and the Superintendent Steven Mandoor, Lafleche enlisted the cooperation of the various vocational shop teachers in allowing a comprehensive assessment of the school for mercury-containing products. The assessment, conducted by Lafleche, John Alphin of SCRAM, Bay Path Building Superintendent Tony Fulginiti and Karen Thomas of the Northeast Waste Management Officials' Association

(NEWMOA) who is implementing one of DEP's mercury pollution prevention pilot programs, collected the following mercury-containing items, which together contained approximately 10 pounds of mercury:

- 3 jars of elemental mercury
- 14 lab thermometers
- 26 fever thermometers, used in the health care assistance training unit
- 60 thermostats from the heating, ventilation and air conditioning (HVAC) lab
- 1 U-tube from the HVAC lab
- 1 gauge
- 587 used fluorescent lamps

Building Superintendent Fulginiti was responsible for managing the proper collection and storage of the collected items until they could be taken away for recycling. Fulginiti oversaw the careful collection of the individual items, their placement in a sealed 5-gallon container or cardboard box for the bulbs, and proper labeling of the containers in accordance with state universal and hazardous waste regulations. With the assistance of the state pilot program, Fulginiti contacted a company that recycles mercury and made arrangements for the containers to be picked up.

Lafleche cites two reasons why enlisting the support of the shop teachers and other staff at Bay Path was relatively easy. First, the state pilot program identified and purchased the non-mercury products to replace those that were removed during the assessment; for example, new electronic thermostats were purchased to replace the traditional mercury thermostats.

Second, in most cases, industries are moving away from using mercury-containing products, so the instructors felt it would benefit the students to learn about the new products. However, in one particular case, the HVAC instructor suggested keeping two older mercury thermostats in special containers so the students can look at them and learn to recognize and properly handle mercury thermostats when they come across them in their future jobs.

When initially discussing the resolution to restrict the purchase of mercury-containing products, the School Committee expressed concerns about whether such a policy might affect the quality of education and instruction the students would receive. Says Lafleche, "Once they found that the educational components weren't going to be compromised, they were comfortable with it."

The move toward mercury-free operations and instruction is just one part of a comprehensive environmental program that has developed at Bay Path. In the summer of 2001, the school underwent a major asbestos removal project, and plans are underway to connect the school to the municipal wastewater treatment plant, allowing for the dismantling of the school's own inadequate sewage treatment facility. Students and staff also are working on projects to prevent pollution of the school's water supply which comes from wells on the property.

"This (mercury) project fit very nicely into our larger environmental awareness program," said Lafleche. "It's a good feeling to know that we are doing something to get mercury out of the environment."

This DEP pilot project is part of the Commonwealth's Zero Mercury Strategy led by the Massachusetts Executive Office of Environmental Affairs. The New England Governors (NEG) and the Eastern Canadian Premiers (ECP) have, through the NEG-ECP Mercury Action Plan, made the virtual elimination of man-made mercury releases to the environment a priority for the New England Region. If you have any questions about mercury, please call the Massachusetts Mercury Hotline at 1-866-9MERCURY (1-866-963-7287). This material was developed by the Northeast Waste Management Officials' Association on contract with DEP and EOEA.

IMPLEMENTING SCHOOL RECYCLING & COMPOSTING PROGRAMS

PLANNING CHECKLIST

A good recycling or diversion program is the result of good planning. Use the checklist below as a guide to help you cover all of the key program elements.

- ___ **Materials Targeted:** *What will be recycled?*
- ___ **Preparation of Materials:** *How must they be prepared or sorted?*
- ___ **Minimum Collection Requirements:** *How much must be stored?*
- ___ **Internal Collection Method:** *Who collects the materials and how?*
- ___ **Internal Collection Equipment:** *What equipment will be necessary?*
- ___ **Storage Site(s):** *Where can you store recyclables until they are picked up?*
- ___ **Hauling:** *Who will be responsible for what?*
- ___ **Promotion:** *How will the recycling program be communicated and explained?*
- ___ **Evaluation and Monitoring:** *How will the program be managed?*
- ___ **Educational Tie-In:** *How will the teachers support recycling in their lessons?*
- ___ **Costs:** *What will be the cost of the program?*
- ___ **Benefits:** *What are the savings? What are the indirect benefits?*

Materials Targeted

By this point you have already determined which recyclable waste materials are being discarded. You also have determined which materials have collection options. For each of these materials identified, plan for the following elements.

Preparation and Handling

Whether you are collecting bottles and cans or white paper, the recycler you have chosen will have certain specifications for material preparation. For example, bottles and cans usually must be at least emptied, white paper cannot have "contaminants" such as newspapers, crayons or Mighty Monkeys lunch boxes mixed in. Be certain about what is accepted and what is not accepted.

Minimum Collection Requirement

A paper recycling company will not come to your school to collect just one piece of paper and a company that collects polystyrene will not visit your school to collect just one Styrofoam coffee cup. For all companies that collect recyclables, there is a minimum amount of material that must be accumulated before it becomes cost effective to send out a truck and a driver. Be sure to note how much material you will need to store.

Internal Collection Method

Consider the flow of recyclables from their point of generation to their point of collection. Who will handle and transport these materials? Some schools rely exclusively upon custodians (recycling is incorporated into their job description), while other schools have designated students, or a club that collects materials on a schedule. A collaborative collection effort between staff and students works very well.

Internal Collection Equipment

Most schools that have instituted paper recycling, have a separate container for recyclable paper in each classroom. These containers can be as simple as cardboard boxes or as standard as a municipal curbside recycling container. These smaller containers must then be emptied into a larger container. *Most recyclers will supply this larger barrel type container.* Food diversion programs usually require, among other items, buckets and 30 to 40 gallon barrels with wheels. Make a list of all of the equipment that you will need.

Storage Site(s)

This is often the place where school recycling programs get derailed. If you cannot find a suitable site, consider a program where wheeled recycling containers are rolled from all corners of the school to the pick up point on the day of collection. Vocational schools or high schools with shop classes have the opportunity to build outdoor

storage sheds for recyclables. Remember to check with the custodians about local fire or health codes; be certain that your planned storage site is safe and acceptable to local inspectors such as the fire marshall.

Hauling

Make certain that you and the recycler agree on all of the terms of the arrangement. If you agree to be serviced on an as needed basis (as opposed to regularly scheduled pick-ups), check to see how far in advance you will have to call for a pick up. It should also be clear to what extent the hauler will go to pick up material. Will they enter the building? How will they handle contaminated loads? Will the hauler simply leave the material? Will you be charged an extra fee for such loads, or will the hauler leave the material and charge you an extra fee as well?

Promotion

Do not skimp on communication. Posters, public address announcements, classroom announcements, and kick-off assembly programs are important tools in getting the word out. Sending information home with students is also effective. You want to motivate students and staff to participate *and* you want them to know exactly what is expected of them. Poor participation or improper participation can ruin even the best made plans.

After the program has been started, plan to let the school know how well it is doing. Many schools have had good motivational success with bulletin board murals that display the number of trees saved, pounds of food diverted, etc. Consider identifying a "Recycler of the Month" and celebrating their accomplishments.

Evaluation and Monitoring

Very few recycling programs run by themselves. It should be the job of the school recycling coordinator, or the coordinating committee, to check the program's progress on a periodic basis. Tonnage totals, participation rates, resources saved, dollars earned or saved are each useful tools for evaluating the impact and progress of the program.

Classroom Support and Educational Tie Ins

Schools with successful diversion programs often support these programs with classroom discussion. At a minimum, teachers should support the program through announcements, reminders and, of course, participation. More importantly though, the concepts of resource conservation and ecology will flourish and have extra meaning if teachers use the recycling program as a vehicle for discussion. The "Solid Waste Management Resource Guide: 1996 Update for Massachusetts Schools" is published by the Department of Environmental Protection and is designed to aid teachers who are interested in an educational tie in. It is available by calling Ann McGovern at DEP (617-292-5834).

Costs

There can be an initial cost to starting a waste diversion or recycling program. There may also be ongoing costs. Examples of initial costs are barrels, buckets or other recycling containers, and promotional materials like paper for posters. And then, of course, there is the value of staff time. Ongoing expenses may consist of collection fees, rental fees or the replacement of damaged or lost containers. From the outset you should know what your expenditures will be and how they will be paid.

Benefits

Some benefits from recycling or composting are measurable and others are not. Throwing away less solid waste can almost always translate into direct savings for the school. Work closely with the administration to measure these savings and lobby to have the amount of the savings added to the school budget if possible. Recycling also conserves natural resources, provides jobs and reduces the impact of manufacturing processes on our air and water. These tangible benefits can be calculated and put into the perspective of one school's impact, but the hardest and perhaps greatest benefit of all to measure is the future impact of students who learn to use natural resources wisely and efficiently.

Source: A MANUAL FOR IMPLEMENTING SCHOOL RECYCLING PROGRAMS, 1998

Available on the DEP web site: www.mass.gov/dep/recycle

Funded by: Commonwealth of Massachusetts, Executive Office of Environmental Affairs, Department of Environmental Protection; research and text by MassRecycle (The Massachusetts Recycling Coalition) and its affiliates: Earthworm, Inc., Center for Ecological Technology (CET), Fundamental Action to Conserve Energy (FACE)

Recycling Education Assistance For Public Schools Service Providers

The following contractors are on Massachusetts state contract EQE-REAPS2-01 through October 12, 2004, to provide classroom presentations and/or assemblies on recycling, composting, worm composting and other solid waste issues. Any political subdivision of the Commonwealth, including municipalities, schools and other service districts, may purchase from this contract. Contact the contractors directly for fees, scheduling and more information about the services offered.

In addition, the Massachusetts Department of Environmental Protection provides free recycling, composting and waste reduction curricula, activities and materials for teachers on-line at www.thegreenteam.org.

Center for Ecological Technology

112 Elm Street

Pittsfield, MA 01201

(413) 445-4556 phone

Contact: Joy Kirschenbaum

Services: Classroom and Assembly Presentations, Technical Assistance, Teacher Training

Web Site: www.cetonline.org

Earthworm Inc.

35 Medford Street

Somerville, MA 02143

(617) 628-1844 phone

Contact: Georgann Funke

Services: Classroom and Assembly Presentations, Teacher Training

Web Site: www.earthwormrecycling.org

Hitchcock Center for the Environment

525 South Pleasant Street

Amherst, MA 01002

(413) 256-0670 phone

Contact: Micky McKinley

Services: Classroom Presentations and Teacher Training

Web Site: www.hitchcockcenter.org

South Shore Natural Science Center

P.O. Box 429

48 Jacobs Lane

Norwell, MA 02061

(781) 659-2559

Contact: Susan Cronin

Services: Classroom and Assembly Presentations, Teacher Training

Web Site: www.ssnsc.org

Jack Golden

P.O. Box 933

Greenfield, MA 01302

(413) 774-3563

Contact: Jack Golden

Services: Assembly Presentations

Web Site: www.garbageismybag.com

TRASH RELAY

RELEVANT LEARNING STANDARDS

Science and Technology/Engineering (revised 2001)		
Grades PreK-2	Physical Sciences	Observable Properties of Objects 1. Sort objects by observable properties such as size, shape, color, weight, and texture.
Grades PreK-2	Technology / Engineering	1. Materials and Tools 1.2 Identify and explain some possible uses for natural materials (e.g., wood, cotton, fur, wool) and human-made materials (e.g., plastic, Styrofoam).

SETUP

- Place the following containers on one side of the room:
 - Trash can
 - Box labeled “Donations to Charities”
 - Compost bin (or box labeled “Compost Bin”)
 - Recycling bin (for bottles and cans)
 - Paper bag (for paper products)
- Place an assortment of clean trash (wash with soap and water if necessary) on a table on the opposite side of the room - see following list of examples. All materials should be free of sharp edges. Use only recyclables and paper products that can be recycled locally. Provide enough items for each child to play 2 or 3 times.

TRASH for trash can

Unused paper towels, Kleenexes, paper plates
Unused plastic sandwich bags, food storage bags
Plastic grocery bags, plastic bags/wrappers from bread, paper towels, etc.
Broken toys
Waxed paper
Candy wrappers
Plastic tableware

REUSABLES for box labeled “Donations to Charities”

Clothing, handbags, hats
Wicker baskets
Kitchenware, plastic glasses / dishes
Linens: towels, blankets, curtains, etc.
Toys in good condition
Books (no textbooks)

COMPOSTABLES for compost bin (sturdy whole fruits & vegetables represent peels/cores)

Fruits: apples, oranges, grapefruit, etc.
Vegetables: carrots, onions, scrubbed potatoes, fresh green beans, etc.
Leaves
Flowers (can be plastic to represent real flowers)

RECYCLABLES for recycling bin

Plastic milk and juice bottles
Tin and aluminum cans (no sharp edges)
Aluminum pie plates
Yogurt / cottage cheese containers
Shampoo bottles
Plastic frozen food trays
Paper milk and juice containers (some programs may put these with paper products)

NOTE: Show an example of a glass container, but do not use it in the game.

PAPER PRODUCTS for paper bag

Newspapers
Magazines
Phone books
Cereal boxes, cookie boxes, frozen food boxes
Envelopes, junk mail
White paper
Mixed paper: colored paper, construction paper, file folders

PLAY THE GAME

- Show examples of discarded items, and discuss the natural materials they were made from. Explain the concepts of reusing, recycling, and composting, and how trash can be diverted from disposal by using these methods.
- The students form two lines, one on each side of the table with trash on it.
- The first student in each line picks up a piece of trash, runs across the room, deposits it into the right container, and returns to the end of the line.
- The next student in line repeats this process, until all the trash is sorted.
- All the students are winners when all the trash is properly sorted (they may be coached by their peers or by teachers).

NOTE: Game should be played where participants may safely run, and where noise is not a problem.

The Resourceful Earth

The Department of Environmental Protection suggests this lesson plan as an extension of the following learning standards:

Department of Education, Science and Technology/Engineering Curriculum Frameworks, Learning Standards		
Grades PreK-2	Earth and Space Science	Earth's Materials 1. Recognize that water, rocks, soil, and living organisms can be found on the earth's surface.
Grades PreK-2	Technology / Engineering	1. Materials and Tools 1.1 Identify and describe characteristics of natural materials (e.g., wood, cotton, fur, wool) and human-made materials (e.g., plastic, Styrofoam). 1.2 Identify and explain some possible uses for natural materials (e.g., wood, cotton, fur, wool) and human-made materials (e.g., plastic, Styrofoam).
Grades 3-5	Earth and Space Science	Rocks and Their Properties 1. Give a simple explanation of what a mineral is and some examples, e.g., quartz, mica.

SUMMARY: Play "Factory" Game: Each student pretends he/she is a raw material (e.g. tree, mineral, sheep), goes through "Factory" box and emerges as a finished product (newspaper, steel can, wool sweater). Each student then pretends he/she is a finished product (newspaper, steel can, wool sweater) and goes through a "Recycling Center" and emerges as a new product (tissue, bicycle); or goes through a "Reuse Center" and emerges as the same product (wool sweater) but is taken home by a different person.

MATERIALS: Three cardboard boxes large enough for a child to fit through, with entry and exit doors cut out (or one box, change title as needed: factory, recycling center, reuse center); string; garbage can filled with different items of clean trash; index cards labeled with headings: Minerals, Oil, Plants, or Animals

TIME: 1 – 1 ½ hours

BACKGROUND

Natural resources are the source of everything we make, use, and throw away. Some raw materials are used in their natural state (e.g., wood), while others are chemically altered. Many of these materials took millions of years to form. Current rates of human consumption and trash generation are starting to rapidly deplete many of the earth's natural resources.

Raw materials fall into two categories: renewable and nonrenewable. Renewable resources can be slowly replaced if they are managed wisely. Trees cut down to make paper or lumber can be replaced by new growth to ensure a continuous supply of wood. Other resources, however, are found in limited quantities; once the current supply is gone, no more is available. Once the earth's deposits of oil or copper run dry, no more can be grown. These are called nonrenewable resources.

GETTING STARTED

Discuss the concepts of renewable and nonrenewable resources with the students. What are some examples of each?

PROCEDURE

FACTORY:

1. Tell the children they are going to play a game called "Factory." Arrange the three large boxes at the front of the room. Label one "Factory," another "Recycling Center", the last "Reuse Center."
(VARIATION: use one box, and change the title as needed: factory, recycling center, reuse center.)

Attach a string from the boxes to an electric pole drawn on the board to represent the use of energy in making goods. Select a student to be the factory operator and another to be a miner or logger. (VARIATION: rotate factory operators – student who goes through factory becomes next factory operator; teacher is miner/logger.) Hand the remaining students an index card representing one of the four resource groups: minerals, oil, plants, or animals.

2. The game starts with the miner “digging out” a certain type of mineral or the logger “cutting down” a tree. The miner/logger brings the raw material to the factory and tells the class which of the four resource groups it represents (based on the card given to each student). The child then goes through the Factory box. Upon emerging from the other side, the student should say what type of basic material the raw material was made into (glass, metal, paper, etc.) and name one use for the product it has become. Hand the child an example of the object they suggested or write it on a card for them to hold. (VARIATION: student shows reverse side of resource card, which depicts a product made from the resource.)

3. After all the children have gone through the factory, ask them where they can get more raw materials. What if there was no more oil for heating homes or trees for making paper? Discuss which of these raw materials are considered renewable and nonrenewable resources. Emphasize that in some cases (e.g., oil) it took millions of years to make the material and it cannot be quickly replaced.

4. Have each child try to think of another way to make the trash item they represent without using virgin materials. For example, they could take the container back to the store for refills, or take newspapers to be recycled. How could a bottle be made without using any new sand? Is there a connection between our shrinking supply of natural resources and the growing amount of waste?

RECYCLING/REUSE CENTERS

1. Select a student to be the recycling/reuse center operator. Hand the remaining students an index card representing one of the recyclable/reusable products: bottle, can, paper, clothing. (See “Factory” variations, procedure #1.)

2. The recycling/reuse center operator brings the recyclable/reusable product to either the recycling center or the reuse center (the same box can be used, change title as needed). The child then goes through the box. Upon emerging from the other side, the student should say what new product the original recyclable product was made into (another container, cereal box, car, tote bag, etc), or have student suggest how the reusable product might be reused (e.g., yard sale, given to friend/relative, donated to charity for resale in thrift shop). Hand the child an example of the object they suggested or write it on a card for them to hold. (See “Factory” variation, procedure #2.)

EXTENSIONS

1. Have the children draw out the factory process, starting with the raw material and following what it is made into and what that is used for (e.g., sand > glass > bottle > milk container). This could also be taken another step by completing what happens to the container after it has been used.

2. Make a bulletin board listing the raw materials used to produce common products. Have the children cut out pictures of objects made from these to add to their trash dictionaries.

3. Conduct a survey of items around the classroom and identify what kinds of raw materials were used to manufacture them. Which resource category and material type is represented the most?



THE GREEN TEAM Lesson Plan

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SLASH TRASH! Reducing, Reusing and Recycling Our Way to Zero Waste

OBJECTIVES

Raise awareness about the problems associated with waste disposal and help students discover how to reduce, reuse and recycle instead. Help students track and measure the results of their actions and see the difference they can make.

BACKGROUND INFORMATION

What is the problem with trash?

Traditional waste disposal methods, landfilling and incineration, can cause environmental problems such as air and water pollution. As wastes decompose in a landfill, methane gas is released, contributing to the greenhouse effect and global warming. If the amount of trash generated by our society continues to rise, future generations will be faced with greater environmental problems as a result.

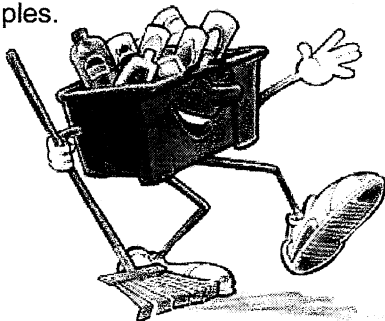
How can we solve the trash problem?

- 1. Reduce** We can cut down on the amount of trash requiring disposal by not creating it in the first place. Ways to reduce waste include avoiding disposable and over-packaged products, buying reusable products, and getting off "junk mail" lists. Home composting can keep nearly half of our household waste out of the traditional disposal system. Items that can be composted include fruit and vegetable scraps, leaves, grass clippings, weeds, garden debris, and nonrecyclable paper products (paper towels, napkins, plates, coffee filters, tea bags, tissue, waxed paper).
- 2. Reuse** We can cut down on the amount of trash requiring disposal by reusing items instead of throwing them away. Examples of reuse include donating unneeded clothing or household items to charities or swap shops, repairing broken items, and reusing items like shopping bags, boxes, containers and aluminum foil.
- 3. Recycle** Many items that cannot be reduced or reused can be recycled, a process that converts them into new products. Newspaper, white paper and cardboard can be recycled into new paper products. Glass, metal and plastic items can be recycled into new containers and the raw materials needed to build a variety of other products, like steel bridges and cars. Organic waste from restaurants, grocery stores and food processing plants can be recycled into compost. The list of materials being recycled continues to grow as new businesses are developed to use waste materials in place of virgin materials in the manufacturing process. It is important to close the recycling loop by buying products made with recycled materials.

ACTIVITY

Discussion

Discuss the problem of trash with your students. Explain the concepts of reducing, reusing and recycling. Ask them for examples of items that commonly get thrown in the trash that could be reduced, reused or recycled instead. Show them such examples.





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Slash Trash Report

By participating in this activity, your students will have an opportunity to see the results of their waste reduction efforts at home.

- Use the template on the back of THE GREEN TEAM Program Guide to make a copy of the Slash Trash Report for each student. Ask them to use the report to keep track of the number of bags of trash disposed and the waste reduction methods used in their homes each week for a month. Encourage students to help their families reduce the amount of trash thrown away. Provide an opportunity for students to share waste reduction ideas and activities with each other.
- At the end of the month, collect the cards and review the results with the students. Help them calculate how much waste they reduced individually and as a class. Empower them with the knowledge that their actions achieved measurable results and that they can make a difference. Encourage them to continue the waste reduction activities they started during the month and to develop new ones as well.



"Slash Trash Report" Step by Step Instructions

1. **Before starting** to track their trash, students begin by writing down the number of bags their family usually disposes each week on the first line of the form (before Week 1). This provides a "baseline" number that will be used to measure differences seen after new recycling and composting activities are used.
2. **Week 1:** Students encourage their families to reduce, reuse, compost and recycle. They circle each activity used in their home that week. At the end of the week, they record the number of bags disposed in the blank "trash bag" in the left column.
3. **Weeks 2 through 4:** Students try to reduce the amount of trash disposed by adding new recycling, composting or other waste reduction activities. If an activity is not listed, students may write the activity in the "other" category. They continue to record the number of bags disposed for each week.
4. **At the end of the 4th week,** students who used new waste reduction activities during the month should be able to observe a reduction in the amount of trash disposed. The number of bags at Week 4 should be smaller than the baseline number filled in on the first line. Some students' forms may show a decrease in the amount of trash disposed on Weeks 1, 2, 3 and 4. Some students may already actively recycle and compost at home and may see little change in their disposal rate. As a measure of their current success, a typical family of four that recycles and composts can keep their trash down to one bag per week. To reduce more, other waste reduction activities such as purchasing in bulk can be added.
5. **To figure the amount of trash reduced on a weekly basis,** subtract the number of bags disposed in a given week from the baseline number. This is how much trash the students and their families eliminated that week by reducing, reusing and recycling. Encourage your students to continue the waste reduction activities they used during the month so that the environmental benefits of their actions will continue.

To tally the total amount of trash slashed by each student during the month, subtract the number of bags reported at Week 1 from the baseline number of bags. Enter this number in the "Bags Eliminated" column. Repeat this process for Weeks 2, 3 and 4. Add up the number of bags eliminated each week to determine the total number of bags of trash eliminated that month. This is the impact the student and their family made during the month by recycling, composting and using waste reduction activities.

To tally the amount of trash slashed by the class as a group, add up the number of bags slashed by each student. This is how much trash your class eliminated by reducing, reusing and recycling!

Slash Trash Report



This is your baseline number

Before we started tracking our trash, we usually had _____ bags of trash each week. For four weeks, I kept track of how we slashed our trash by recycling, composting, reducing and reusing. Here are my results:

WEEK	WHAT DID YOU DO?	BAGS ELIMINATED
WEEK 1	<p>WHAT DID YOU DO?</p> <p>We Recycled: <input type="checkbox"/>paper <input type="checkbox"/>glass <input type="checkbox"/>aluminum <input type="checkbox"/>metal cans <input type="checkbox"/>plastic <input type="checkbox"/>other: _____</p> <p>We Composted: <input type="checkbox"/>leaves and grass <input type="checkbox"/>food scraps <input type="checkbox"/>other: _____</p>	_____
WEEK 2	<p>WHAT DID YOU DO?</p> <p>We Recycled: <input type="checkbox"/>paper <input type="checkbox"/>glass <input type="checkbox"/>aluminum <input type="checkbox"/>metal cans <input type="checkbox"/>plastic <input type="checkbox"/>other: _____</p> <p>We Composted: <input type="checkbox"/>leaves and grass <input type="checkbox"/>food scraps <input type="checkbox"/>other: _____</p>	+ _____
WEEK 3	<p>WHAT DID YOU DO?</p> <p>We Recycled: <input type="checkbox"/>paper <input type="checkbox"/>glass <input type="checkbox"/>aluminum <input type="checkbox"/>metal cans <input type="checkbox"/>plastic <input type="checkbox"/>other: _____</p> <p>We Composted: <input type="checkbox"/>leaves and grass <input type="checkbox"/>food scraps <input type="checkbox"/>other: _____</p>	+ _____
WEEK 4	<p>WHAT DID YOU DO?</p> <p>We Recycled: <input type="checkbox"/>paper <input type="checkbox"/>glass <input type="checkbox"/>aluminum <input type="checkbox"/>metal cans <input type="checkbox"/>plastic <input type="checkbox"/>other: _____</p> <p>We Composted: <input type="checkbox"/>leaves and grass <input type="checkbox"/>food scraps <input type="checkbox"/>other: _____</p>	+ _____

To find out how many bags of trash your family slashed, subtract the number of bags reported each week from the baseline number on line 1. Write this number in the "Bags Eliminated" column. Add up the number of trash bags eliminated each week. This is the impact you and your family made during the month.

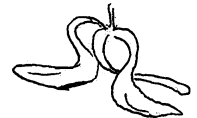
Total Bags Eliminated

= _____

Compare your results each week. How low did you go?

This Month!

Slash Trash Report



This is your baseline number

Before we started tracking our trash, we usually had _____ bags of trash each week. For four weeks, I kept track of how we slashed our trash by recycling, composting, reducing and reusing. Here are my results:

WEEK	WHAT DID YOU DO?	BAGS ELIMINATED
WEEK 1	<p>WHAT DID YOU DO?</p> <p>We Recycled: <input type="checkbox"/>paper <input type="checkbox"/>glass <input type="checkbox"/>aluminum <input type="checkbox"/>metal cans <input type="checkbox"/>plastic <input type="checkbox"/>other: _____</p> <p>We Composted: <input type="checkbox"/>leaves and grass <input type="checkbox"/>food scraps <input type="checkbox"/>other: _____</p>	_____
WEEK 2	<p>WHAT DID YOU DO?</p> <p>We Recycled: <input type="checkbox"/>paper <input type="checkbox"/>glass <input type="checkbox"/>aluminum <input type="checkbox"/>metal cans <input type="checkbox"/>plastic <input type="checkbox"/>other: _____</p> <p>We Composted: <input type="checkbox"/>leaves and grass <input type="checkbox"/>food scraps <input type="checkbox"/>other: _____</p>	+ _____
WEEK 3	<p>WHAT DID YOU DO?</p> <p>We Recycled: <input type="checkbox"/>paper <input type="checkbox"/>glass <input type="checkbox"/>aluminum <input type="checkbox"/>metal cans <input type="checkbox"/>plastic <input type="checkbox"/>other: _____</p> <p>We Composted: <input type="checkbox"/>leaves and grass <input type="checkbox"/>food scraps <input type="checkbox"/>other: _____</p>	+ _____
WEEK 4	<p>WHAT DID YOU DO?</p> <p>We Recycled: <input type="checkbox"/>paper <input type="checkbox"/>glass <input type="checkbox"/>aluminum <input type="checkbox"/>metal cans <input type="checkbox"/>plastic <input type="checkbox"/>other: _____</p> <p>We Composted: <input type="checkbox"/>leaves and grass <input type="checkbox"/>food scraps <input type="checkbox"/>other: _____</p>	+ _____

To find out how many bags of trash your family slashed, subtract the number of bags reported each week from the baseline number on line 1. Write this number in the "Bags Eliminated" column. Add up the number of trash bags eliminated each week. This is the impact you and your family made during the month.

Total Bags Eliminated

= _____

Compare your results each week. How low did you go?

This Month!

